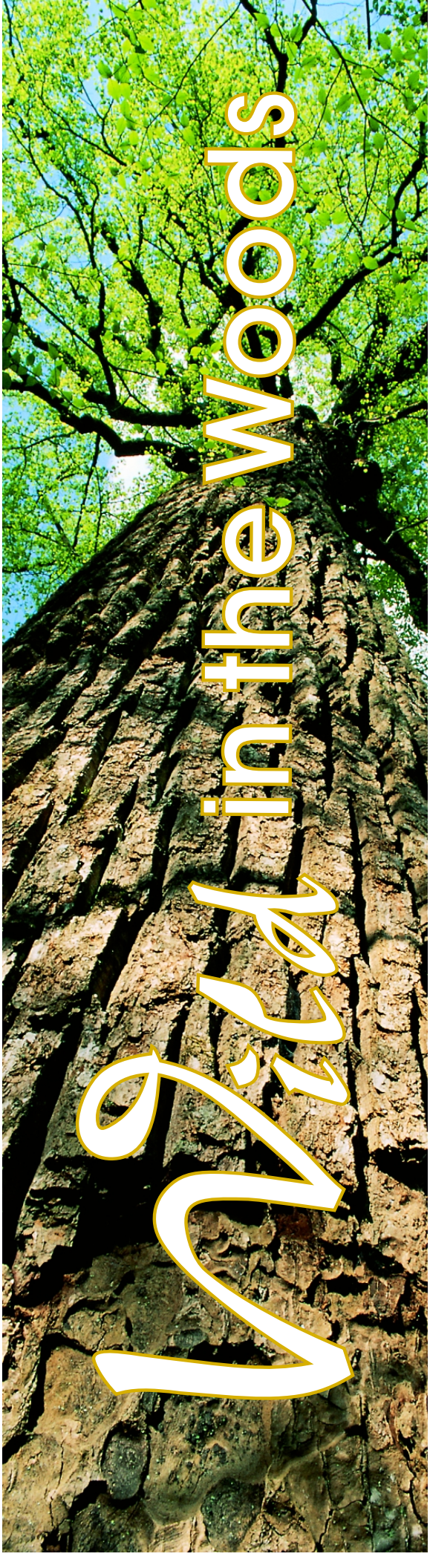


Keeping Track: Wildlife on the Move

by Carol A. Heiser
illustrations by Spike Knuth

Longer days, warmer breezes, and the first hint of green on the trees are all end-of-winter benchmarks that have many of us outdoors in the garden, taking walks, or fishing. Observant nature enthusiasts might catch a far-off glimpse of migrating hawks or hear the insistent honking of a flock of geese or swans as they melt away over the horizon on surefire wingbeats. As spring unfolds, all sorts of animals are on the move—some traveling thousands of miles from one continent to another, others traversing only one or two states as they expand their seasonal home ranges. Getting a handle on where all these animals go and how they get there can involve some unusual and sophisticated tracking technology, including radiotelemetry, tagging and monitoring, and bar coding. These state-of-the-art methods help land managers identify crucial habitats and make conservation decisions that work on wildlife's behalf.

Now You See It, Now You Don't

Being able to recognize a few individual animals in a population made up of thousands is the first challenge. After all, how do you **really** know that the hummingbirds which return to your feeder each spring are the same ones that were there last year, if they all look pretty much the same? Biologists use a simple but indispensible method to answer these types of questions, a method known variously as *catch-and-release, tag-and-release,* or *mark-and-recapture*.

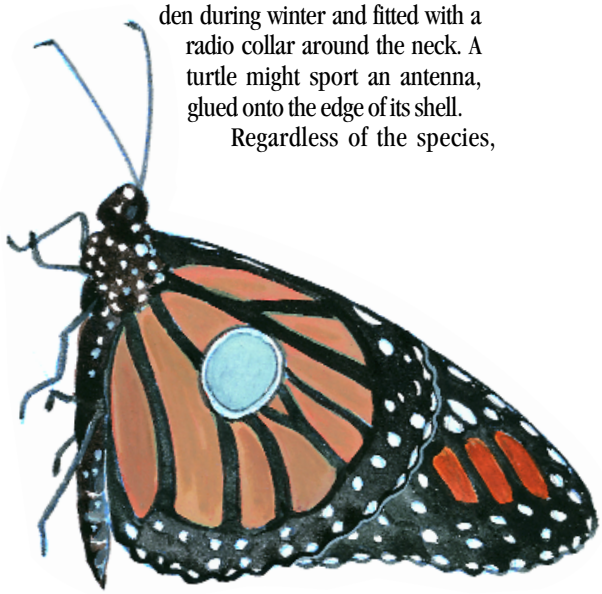
The idea is to carefully capture some individual animals without harming them, mark them in some identifying way, and let them go. If enough individual animals are marked and enough people around the world participate in the endeavor, then eventually some of these same animals are caught again, usually in locations far-flung from their original point of capture. Over time, the data collected on these individuals can be used to paint a broader picture of how and where the entire population moves during the course of a season or a year. More importantly, the information reveals valuable insights about the types of habitats that migrating animals depend on as they follow their annual routes like clockwork.

The mark-and-recapture method varies, depending on what type of animal is being studied. For example, the monarch butterfly

Delving into the day-to-day habits of an animal requires a lot of patience and equipment that is specially suited to help track its movement. For example, a black bear (above) is outfitted with a radio collar around the neck, a monarch butterfly (right) has an adhesive sticker placed on the wing, and a wild turkey (below) is implanted with a transmitting device.

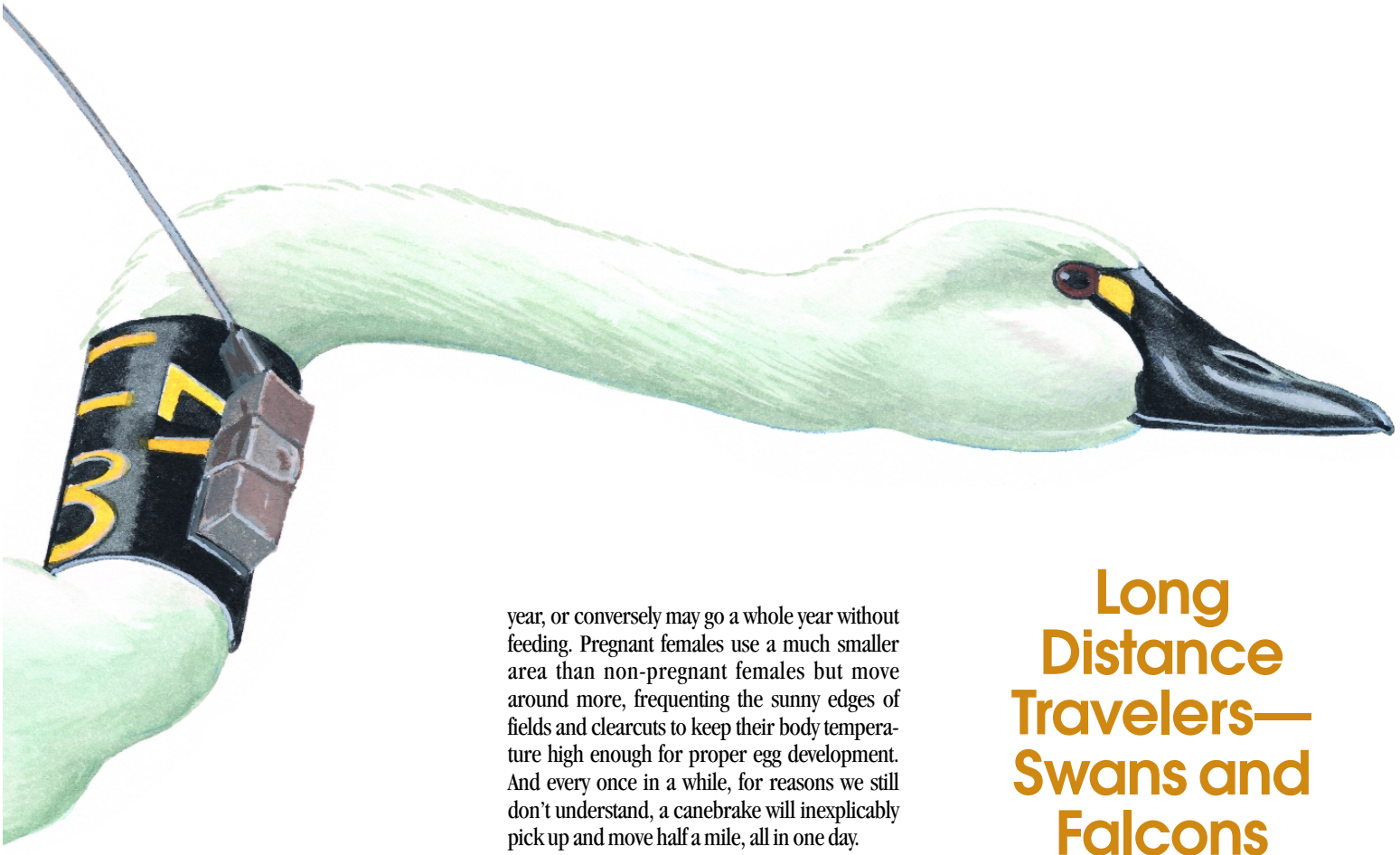
is captured with a net and is tagged with an adhesive sticker on its wing. A songbird or hawk is caught in a fine mist net that looks like a badminton net with extra pockets, and the bird is given a loose-fitting, metal ankle bracelet. A snake is caught with a snake hook and pillowcase, then surgically implanted with a transmitter. A bear is anesthetized in its den during winter and fitted with a radio collar around the neck. A turtle might sport an antenna, glued onto the edge of its shell.

Regardless of the species, pertinent data is always recorded whenever an individual animal in a study is caught. Weight, health, sex, age, breeding status, location, and other important details are noted. In this way, the data from one capture can be compared to another.



Listening for Beeps

Tracking wildlife can be done on foot, by plane, with a vehicle, or in the case of satellite telemetry—at one's desktop computer. Traditional *radiotelemetry* equipment requires the use of a *transmitter*—a small, electronic signalling device attached to the animal's body—and a hand-held "black box" (*receiver*) with accompanying *antenna* that's a miniaturized version of TV antennae seen on rooftops. A biologist tracks the marked quarry on foot (see illustration at right) or by vehicle, moving through the study area with the antenna until the receiver picks up the transmitter signal and emits a series of audible beeps. Following the loudest beeps, the biologist can continuously adapt the direction of his tracking until the animal is located.



The Dawdlers—Snakes and Turtles

Using radiotelemetry, you can learn intriguing details about a day in the life of, say, a rattlesnake. Old Dominion University is in the 10th year of its canebrake rattlesnake research in the Chesapeake area. Little was known about this endangered species' movements or habits until about 30 individuals were marked at one time or another over the 10 year period and tracked with between 8,000–10,000 observations. We now know that males have a home range (150 acres) that's twice as large as females and that males move twice as far (only three and one-half miles) within this range during a breeding cycle. The snakes spend an incredible 40 percent of each day lying in wait on the forest floor for prey; their primary food source is the eastern gray squirrel; and an individual snake may eat up to five squirrels in one year, or conversely may go a whole year without feeding. Pregnant females use a much smaller area than non-pregnant females but move around more, frequenting the sunny edges of fields and clearcuts to keep their body temperature high enough for proper egg development. And every once in a while, for reasons we still don't understand, a canebrake will inexplicably pick up and move half a mile, all in one day.

Other curious creatures like the wood turtle are also being studied. The Virginia Department of Game and Inland Fisheries (VDGIF) and George Mason University began a wood turtle study in 1998 in an effort to conserve this state-threatened species, which has experienced significant habitat destruction by commercial and residential development as well as poaching for the pet trade, road mortality, and habitat fragmentation. Radiotelemetry is being used to help determine the turtles' habitat use and movement patterns in urban, agricultural, and forested land-use types.

Long Distance Travelers—Swans and Falcons

A relatively newer method of tracking is *satellite telemetry*. It also uses a transmitter on an animal but relies on a satellite to do the tracking. At any given moment, the monitoring person can pinpoint the exact coordinates of the marked animal's location. Satellite monitoring works well for large animals that travel great distances.

Satellite telemetry is useful for monitoring the movements of wildlife that travel great distances, like swans (above) and peregrine falcons (right). Swans equipped with small satellite transmitters have been tracked as far away as Alaska, while peregrine falcons have been tracked on their fall migration to Florida, and even the Dominican Republic.

In February of 2001, VDGIF captured two tundra swans at the Hog Island Wildlife Management Area and in Essex County and outfitted them with satellite transmitters. Twenty other swans were equipped with radio transmitters, and 100 more with identifying neck collars. Over 9,000 tundra swans winter in eastern Virginia along the major rivers and the Eastern Shore, and they journey north to the Canadian

tundra in spring to breed. The **radio** transmitters will help determine the swans' **local** movements and the habitat types they use while they're in Virginia for the winter. The **satellite** transmitters will track the swans' migration back to Canada. The first year of the *SwanTrak* data has already revealed that Virginia tundra swans follow migratory routes that are distinctly different from their cousin swans that winter in North Carolina. Wetlands and lakes in the prairie pothole regions of North America are also clearly implicated as crucial stopover habitats.

FalconTrak is another Department project designed to shed light on the migratory habits of the peregrine falcon, a state threatened species. Sixteen peregrines were fitted with satellite transmitter vests in the spring and summer of 2001. Four have survived as of this writing, and of these, three migrated in the fall to South Carolina, Florida, and the Dominican Republic. Plans this year are to outfit additional peregrine fledglings (young birds) with transmitters to see if these results will be consistent from year to year.

Fish with a Bar Code

How do you keep track of a wriggling fish on the move? By using the same technology common at your local grocery store. Biologists implant a tiny wire that contains a *bar code* beneath a fish's skin. The binary wire code is a unique identifier that indicates the date, body of water, and other particulars about where the fish was initially marked and released. At a later date and location, researchers collect fish in nets and scan them with a "wand" that beeps when it registers a bar code signal in a marked fish. This method is just one tool being used by the Department to restore the American shad, an *anadromous* or migratory fish, that spends part of its life in the ocean and then returns upstream to breed in freshwater rivers. Results of the study thus far have guided the construction of fish passageways through obstructions like Bosher's Dam on the James River and other tributaries important to the shad's migration.

Learning More…

- See SwanTrak and FalconTrak at the Virginia Department of Game and Inland Fisheries Web site: **www.dgif.state.va.us**. A classroom activity on SwanTrak for grades 4-8 is also available.
- Bog Turtle Survey of Three Lakes Nature Center in Richmond, Virginia **www.fwie.fw.vt.edu/VHS/bog_turtle.htm**
- Radiotelemetry at the Smithsonian's Conservation and Research Center in Front Royal, Virginia, **www.si.edu/crc/rp/rp_nature/rp_eco/tele/rp_tel.htm**

Carol Heiser is a Wildlife Habitat Education Coordinator with the Virginia Department of Game and Inland Fisheries.

Virginia Naturally

SwanTrak with Students

(a Virginia adaptation of the Project WILD activity, Migration Barriers)

Grade Levels: 4-8

Duration: One or two 50 minute periods

Vocabulary: migration, habitat, stopover, transmitter, land-use planning, consequences

Standards of Learning: Science 4.5, 5.1, 6.8, 6.11; Life Science .7 and .12; Earth Science .3 and .7; Computer/Technology 5.3, 8.2; Math 4.12, 5.11, 6.10, 7.21; Civics 7.9

Objectives: Students will 1) draw a map of tundra swan migration and define migration as it relates to wildlife; 2) describe habitat components essential to successful swan migration; and 3) describe possible impacts and consequences of human land-use activities on migrating wildlife.

Materials: 1) Drawing tools—paper (large butcher paper or poster board), markers, pencils, and rulers; 2) Atlas; and 3) Text, maps and data about tundra swan migration and habitats from the Virginia Department of Game and Inland Fisheries' Web site www.dgif.state.va.us.

Background: Tundra swans spend the winter in eastern Virginia and in the Carolinas. In the spring, they migrate through the Great Lakes region and continue on to the northern prairies of North America to breed. The swans migrate in a northwesterly direction, fueled by stored energy and the food they find along the way. The migrating swans travel long distances along specific routes established thousands of years ago. To complete the route, swans must have suitable stopover areas for resting and feeding. Satellite transmitters have been placed on tundra swans in Virginia, Maryland, Pennsylvania, and North Carolina. The Department of Game and Inland Fisheries' Web site provides locations of nesting, wintering, and stopover sites used by these transmitting swans.

Swans require some important components in both the summer breeding habitat and the winter resting habitat: open water, abundant food, and appropriate shelter. The Department of Game and Inland Fisheries' Hog Island Wildlife Management Area (WMA) in Surry County, Virginia is located on the southern shore of the James River (across from Jamestown) and provides the water, food, and protection that swans—and many other waterfowl species—need through the winter months. Approximately 100 tundra swans overwinter at the management area.

Procedure: 1) Divide the students into small working groups. Provide each group with drawing materials and a large piece of butcher paper or poster board. Ask each group to draw a map/ mural depicting North America, using the Atlas for guidance on geography and scale. 2) Familiarize students with the tundra swan maps and data on the Department's Web site. 3) Using the Web site for accuracy, have students mark various points on their maps that illustrate the swans' flight path from Virginia to the tundra. 4) Have students draw the habitat components of the prairie pothole regions that are so important to the swans' migratory stopovers. 5) Then have students draw a set of arrows that illustrate the return migration which the swans follow from the tundra back to their summer breeding grounds in the Southeast. Once the maps/murals are complete, younger students can describe what they have included in their murals and point out the tundra swan migration route. Older students can continue on to the next two steps in this activity: 6) Describe a scenario in which people who live along the swans' migration route would like to drain the prairie potholes to raise agricultural crops or to develop a new shopping mall. Have students outline a land-use plan on their map that preserves the prairie pothole habitat while also compensating farmers and/or developers. Their plan should include a narrative that considers: the solutions that they think would be acceptable or unacceptable; the final decision that they made; the consequences of their plan on the tundra swans, vegetation, and people. 7) Ask each group to report on their plan and explain their choices and reasoning. Follow-up questions might include: How do we balance the needs of swans with the farmers' need to increase crop yields by cultivating more land? Is the community in need of additional commercial activity? What are some factors to be considered in land-use decisions? During the discussion, emphasize that there is no right or wrong answer but that there are many points of view which must be considered before all may arrive at a consensus.

Evaluation Questions:

How long does it take a tundra swan to migrate to Virginia? How many miles does a tundra swan travel in a day? Which swans traveled the greatest distance? (use the map scale and data from the web site to measure)

Discuss the migration routes and destinations of tundra swans. What types of stopover habitats do the swans prefer along their migration route? northern prairies (prairie 'potholes'), lakes, large freshwater wetlands

Consider the impact of habitat destruction at stopover points along their migratory route and in their summer breeding grounds in the northern tundra. What happens if the swans find no food or resting places at a needed stopover? Swans that cannot find enough food may perish, or they may reach their destinations too weak to thrive or reproduce. What happens if tundra swans find no food at a stopover location due to the introduction of non-native mute swans? Since mute swans do not migrate, their year-long presence can deplete food resources needed by the tundra swans. What effect would drought conditions in the upper Midwest have on tundra swan migration? Traditional stopover locations in the prairie pothole region of the Dakotas and south central Canada are crucial to swans for building up the body fat reserves they need for their continued migration north and in preparation for spring breeding.

Extensions: 1) Compare the migration routes of Virginia tundra swans to those of tundra swans which overwinter in North Carolina, Pennsylvania, and Maryland; 2) Plot the routes of other waterfowl species that might use the Hog Island Wildlife Management Area—such as the Canada goose or the snow goose—using field guides and other natural history resources.